Wetlands

Description

National Wetlands Inventory (NWI) data uses the Cowardin classification system, adopted by the NPS. According to this system, there are 4 categories of wetlands within CEBE: freshwater emergent, freshwater forested/shrub, freshwater pond, and riverine. There are approximately 23.7 acres of wetlands within CEBE (Figures 23, 24, and 25) (Table 2), excluding riverine wetlands. Including riverine wetlands there are approximately 76.4 acres. Of the freshwater emergent wetlands, PEM1C is palustrine, meaning it is nontidal, salinity < 0.5 ppt, water depth < 2 meters, and does not have a wave formed or bedrock shoreline. This wetland is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. The vegetation is present for most of the growing season in most years. This persistent wetland is dominated by plant species that normally remain standing at least until the beginning of the next growing season. PEM1C is also seasonally flooded with surface water present for extended periods in the growing season, but absent by the end of the growing season in most years. The water table is variable and could be saturated to the surface or well below the ground surface. This wetland is located just north of the North Fork of the Shenandoah River (Figure 25).

PEM1A is similar to PEM1C but, instead of being seasonally flooded, is temporarily flooded. This means that surface water is present for brief periods during the growing season but the water table usually lies well below the soil surface. This wetland is located directly beside PEM1C and is much larger (Figure 25).

PEM1Ch is similar to PEM1C except it is diked or impounded. It was created or modified by a man-made barrier or dam which obstructs the inflow and outflow of the water. This wetland is located just north of I-81 (Figure 24).

PFO1A is also palustrine but is forested by woody vegetation that is at least 6 meters in height. The woody plants are broad-leaved deciduous according to NWI. Like PEM1A, this wetland is temporarily flooded. There are 3 wetlands of the PFO1A type in CEBE. Two are along the Cedar Creek and one is associated with the North Fork of the Shenandoah River (Figure 25).

The PUBHh wetlands are palustrine as well. They have an unconsolidated bottom with >25% cover of particles that are < 6 to 7 centimeters and a vegetative cover less than 30%. These wetlands are also permanently flooded and diked or impounded. Scattered throughout CEBE, these wetlands may be fish ponds or agricultural ponds, with the largest being approximately 1.64 acres (Figure 23, 24, and 25).

The North Fork of the Shenandoah River contributes to wetland R2UBH. This wetland is categorized as riverine and includes all wetlands and deepwater habitats contained in natural or artificial channels that connect two bodies of standing water. The river is a lower perennial waterway with low gradients, slow water velocity, and no tidal influence.

Sand and mud make up the substrate. It has a well developed floodplain, an unconsolidated bottom, and is permanently flooded (Figure 25).

Recommendations

The NWI data is not precise. It is recommended that the wetlands within CEBE be delineated and mapped using a Global Positioning System. It is important that wetland boundaries are known so that appropriate areas may be protected. Buffers should exist around wetlands to ensure that they are not degraded and so that wildlife populations are not disturbed. They should be of sufficient size to ensure wetland features are not degraded by maintenance, construction, or future activities. The size of these buffers and the vegetative species present should be determined by natural resource managers after visiting the site.

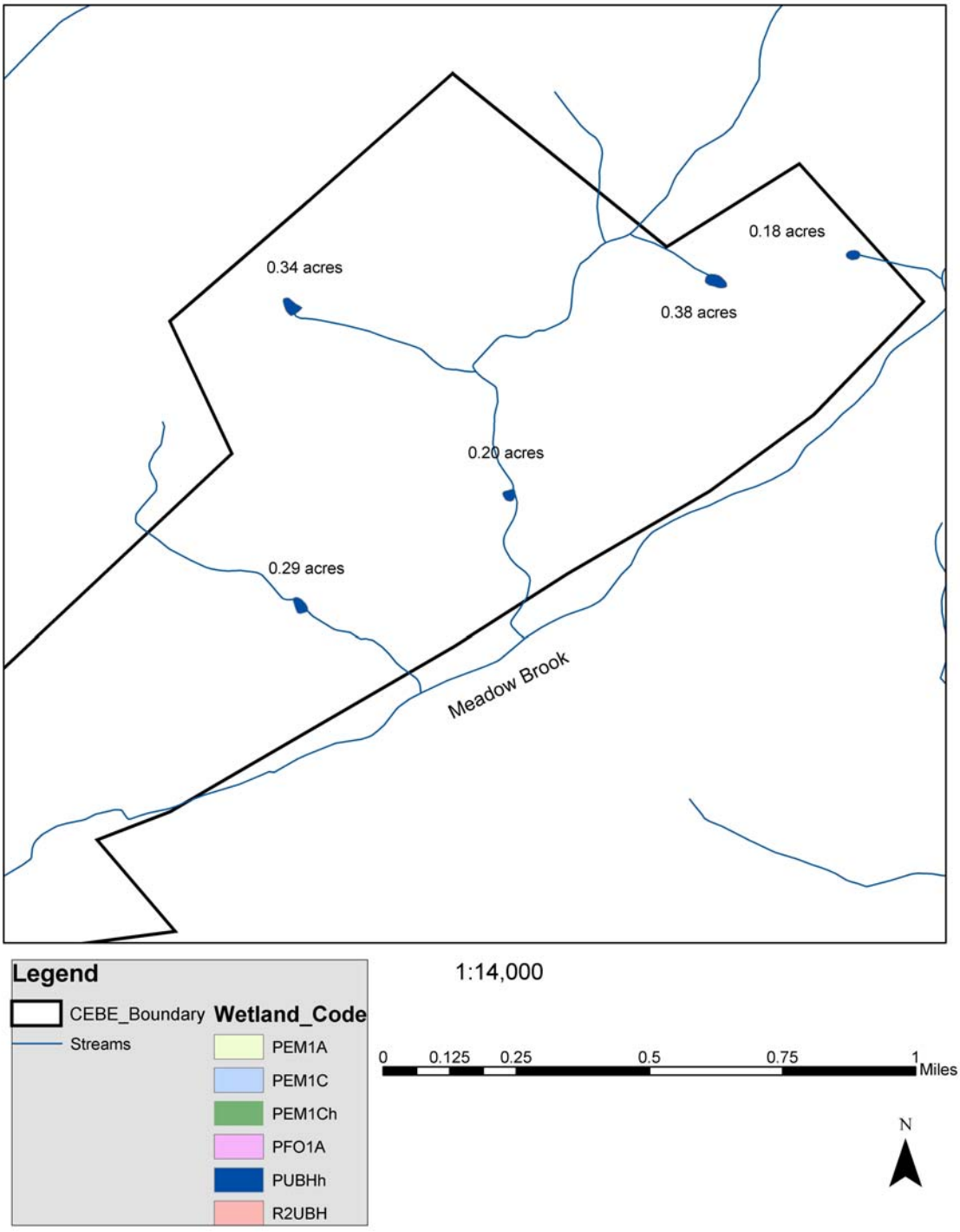

Figure 23. Wetlands of the Cedar Creek and Belle Grove National Historical Park (CEBE) and their associated acreages and codes (northern section). Wetland codes are defined within text. Data provided by the United States Fish and Wildlife Service 2004.

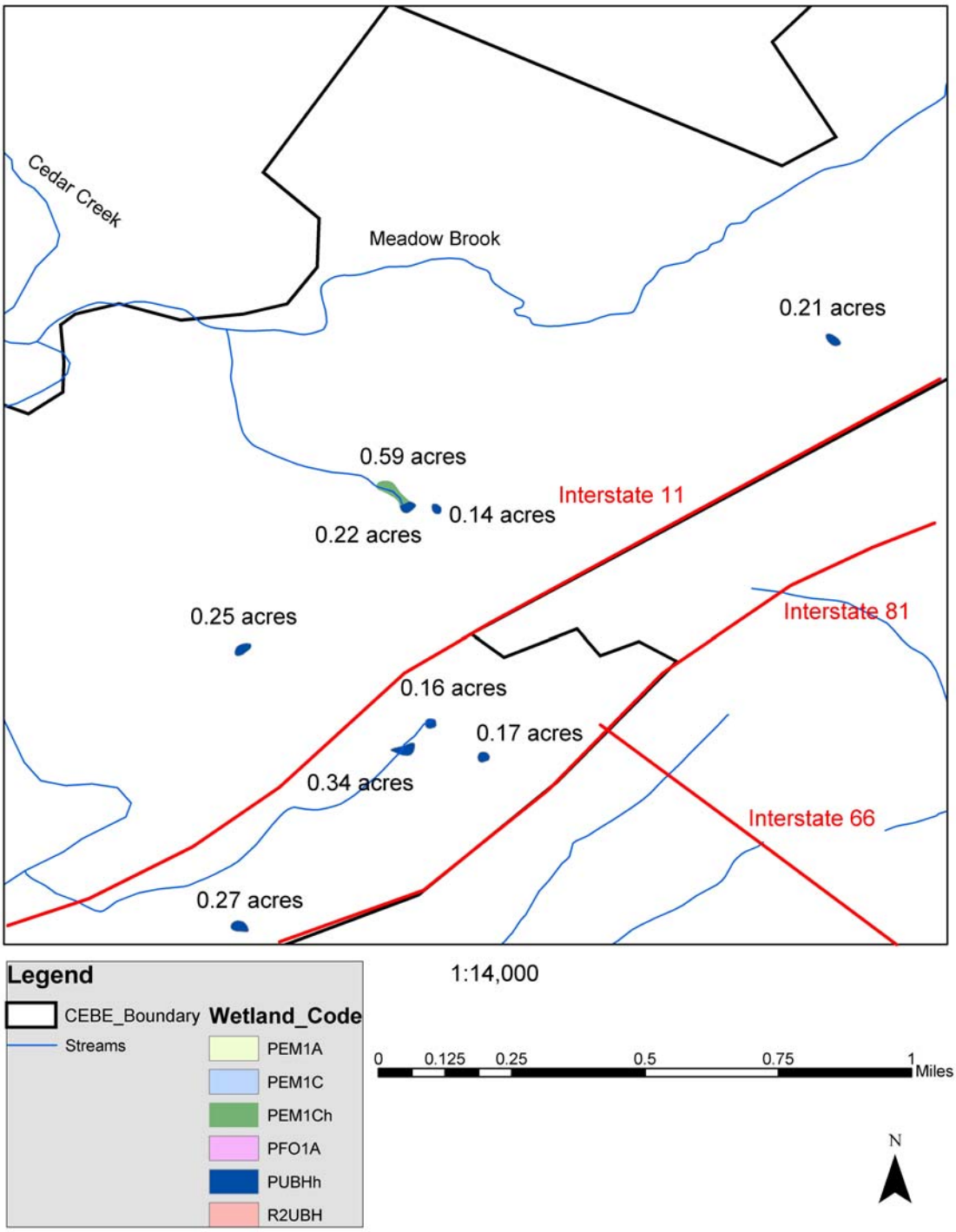

Figure 24. Wetlands of the Cedar Creek and Belle Grove National Historical Park (CEBE) and their associated acreages and codes (middle section). Wetland codes are defined within text. Data provided by the United States Fish and Wildlife Service 2004.

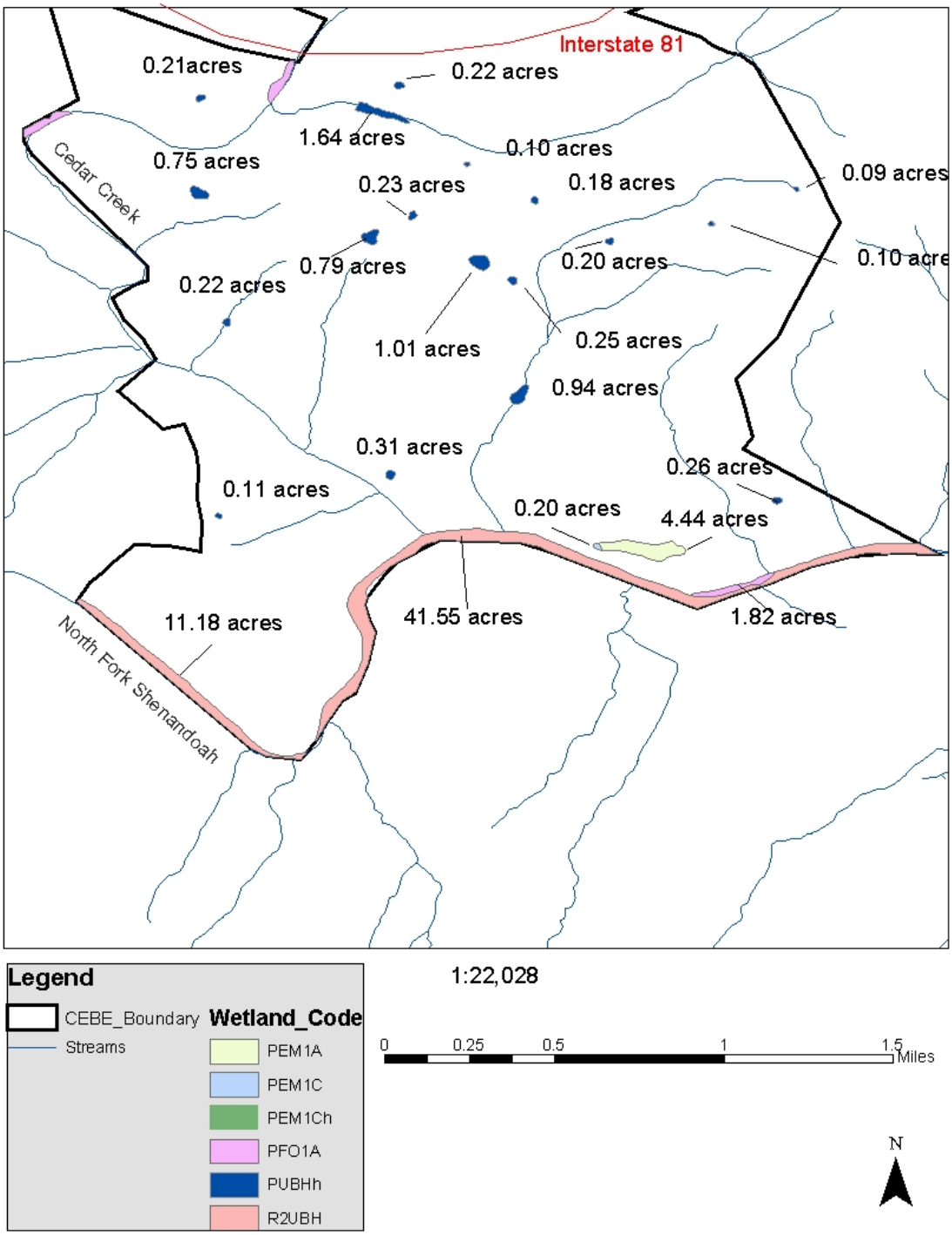

Figure 25. Wetlands of the Cedar Creek and Belle Grove National Historical Park (CEBE) and their associated acreages and codes (southern section). Wetland codes are defined within text. Data provided by the United States Fish and Wildlife Service 2004.

Table 2. Wetland acreages in the Cedar Creek and Belle Grove National Historical Park (CEBE). Data provided by the U.S. Fish and Wildlife Service National Wetlands Inventory 2004.

Attribute	Wetland Type	Acres		
R2UBH	Riverine	11.18		
R2UBH	Riverine	41.55	Total	52.73 acres
PFO1A	Freshwater Forested/Shrub Wetland	1.82		
PFO1A	Freshwater Forested/Shrub Wetland	1.52		
PFO1A	Freshwater Forested/Shrub Wetland	1.67	Total	5.01 acres
PEM1C	Freshwater Emergent Wetland	0.20		
PEM1A	Freshwater Emergent Wetland	4.44	Total	4.65 acres
PEM1Ch	Freshwater Emergent Wetland	0.59		
PEM1Ch	Freshwater Emergent Wetland	0.59	Total	1.18 acres
PUBHh	Freshwater Pond	0.11		
PUBHh	Freshwater Pond	0.26		
PUBHh	Freshwater Pond	0.31		
PUBHh	Freshwater Pond	0.94		
PUBHh	Freshwater Pond	0.22		
PUBHh	Freshwater Pond	0.25		
PUBHh	Freshwater Pond	1.01		
PUBHh	Freshwater Pond	0.20		
PUBHh	Freshwater Pond	0.79		
PUBHh	Freshwater Pond	0.10		
PUBHh	Freshwater Pond	0.23		
PUBHh	Freshwater Pond	0.18		
PUBHh	Freshwater Pond	0.09		
PUBHh	Freshwater Pond	0.75		
PUBHh	Freshwater Pond	0.10		
PUBHh	Freshwater Pond	1.64		
PUBHh	Freshwater Pond	0.21		
PUBHh	Freshwater Pond	0.22		
PUBHh	Freshwater Pond	0.27		
PUBHh	Freshwater Pond	0.17		

Table 2. Wetland acreages in the Cedar Creek and Belle Grove National Historical Park (CEBE). Data provided by the U.S. Fish and Wildlife Service National Wetlands Inventory 2004 (continued).

Attribute	Wetland Type	Acres		
PUBHh	Freshwater Pond	0.34		
PUBHh	Freshwater Pond	0.16		
PUBHh	Freshwater Pond	0.25		
PUBHh	Freshwater Pond	0.14		
PUBHh	Freshwater Pond	0.22		
PUBHh	Freshwater Pond	0.21		
PUBHh	Freshwater Pond	0.29		
PUBHh	Freshwater Pond	0.27		
PUBHh	Freshwater Pond	0.17		
PUBHh	Freshwater Pond	0.34		
PUBHh	Freshwater Pond	0.16		
PUBHh	Freshwater Pond	0.25		
PUBHh	Freshwater Pond	0.14		
PUBHh	Freshwater Pond	0.22		
PUBHh	Freshwater Pond	0.21		
PUBHh	Freshwater Pond	0.29		
PUBHh	Freshwater Pond	0.20		
PUBHh	Freshwater Pond	0.34		
PUBHh	Freshwater Pond	0.38		
PUBHh	Freshwater Pond	0.18	Total	12.83 acres

Vegetation

Description

A GIS shapefile of U.S. ecoregions was used to determine climatic location of CEBE. The domain is: Humid Temperate; the division is: Hot Continental Regime Mountains; the province is: Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow; the section is: Northern Ridge and Valley. Forests comprise approximately 40% of CEBE, according to 1997 aerial photographs. A GIS forest cover layer was created by the Virginia Department of Forestry from Landsat 7 ETM+ satellite imagery acquired in 1999 and 2000 (Figure 26). The data show that the majority of the forest land occurs in the southern half of CEBE with patches in the northern section. Overlaying this layer on the aerial photographs shows the two layers concur.

At least 46 deciduous and angiosperm tree species may exist within CEBE. A listing of vegetative species found in the area was compiled by Gerald Crowell of the Virginia Department of Forestry and is included in Appendix 8. A listing of nonnative species and native species for Virginia is included in Appendix 9 and 10, respectively. Deciduous native tree species of CEBE include northern red oak (*Quercus rubra*), white oak (*Quercus alba*), beech (*Fagus grandifolia*), shagbark hickory (*Carya ovata*), and red maple (*Acer rubrum*). Coniferous native tree species include eastern hemlock (*Tsuga canadensis*), eastern white pine (*Pinus strobus*), pitch pine (*Pinus rigida*), shortleaf pine (*Pinus enchinata*), and table-mountain pine (*Pinus pungens*).

Non-native, highly invasive species that could be found within CEBE include tree of heaven (*Ailanthus altissima*), garlic mustard (*Alliaria petiolata*), Japanese honeysuckle (*Lonicera japonica*), Japanese stilt grass (*Microstegium vimineum*), Japanese knotweed (*Polygonum cuspidatum*), mile-a-minute (*Polygonum perfoliatum*), kudzu vine (*Pueraria Montana*), multiflora rose (*Rosa multiflora*), and Johnson-grass (*Sorghum halepense*). Tree of Heaven is highly invasive, fast growing, and produces a large amount of seeds. The native black walnut can be confused with Ailanthus.

Vegetative species listed by the Virginia Natural Heritage as being significant, endangered, or threatened within 2 miles of CEBE can be found in Appendix 11 along with status. Those listed include Canby's mountain-lover (*Paxistima canbyi*), narrow-leaved blue-curls (*Trichostema setaceum*), hawthorn (*Crataegus pruinosa*), tall thistle (*Cirsium altissimum*), bent milkvetch (*Astragalus distortus var. distortus*), and hairy beardtongue (*Penstemon hirsutus*). A U.S. Fish and Wildlife Service listing of vegetative species according to county is located in Appendix 12 along with status. These species include shale barren rock cress (*Arabis serotina*), northeastern bulrush (*Scirpus ancistrochaetus*), Schweinitz's sedge (*Carex schweinitzii*), Canby's Mountain-lover, bog bluegrass (*Poa paludigena*), variable sedge (*Carex polymorpha*), tall larkspur (*Delphinium exaltatum*), and harperella (*Ptilimnium nodosum*). U.S. Fish and Wildlife Service information sheets for the shale barren rock cress and northeastern bulrush are included in Appendices 13 and 14, respectively.

Two orchards can be found within CEBE in the northern section of the park. They are represented in Figure 2 by green squares in a checkerboard pattern.

Pest Threats

Larvae of the fall cankerworm can cause defoliations of hardwood trees. An aerial survey of fall cankerworm defoliation in 2002 shows impacted areas in the Blue Ridge counties (Virginia Department of Forestry (VDOF) 2002). CEBE is approximately 19 miles northwest of one of the impacted areas and may not have been examined for cankerworm effects. It is possible that CEBE could have had defoliations from this event or could have future infestations.

In June 2002, aerial observers identified gypsy moth caterpillar defoliations (VDOF 2002, 2003). The nearest affected area was 4 miles southwest of CEBE. In 2003, another aerial observation revealed gypsy moth damage 8 miles west and 9 miles southwest of CEBE. It is possible that light or small patches of defoliations were overlooked by the aerial observers. CEBE forests could have been affected by gypsy moths or will be in the future.

Hemlock woolly adelgids, which were accidentally introduced to the country in the 1880's on imported hemlock nursery stock, have killed thousands of hemlock trees in Shenandoah National Park, which is approximately 8 miles southeast of CEBE. Shenandoah's riparian areas have been devastated by this pest (NPS 2004). It is possible that this pest could threaten hemlock forests located within CEBE.

Forest Fire Risk

A forest fire risk assessment was completed by the Virginia Department of Forestry using GIS in order to identify areas where conditions were more favorable to wildfire occurrence and to identify areas that require closer scrutiny at larger scales. In addition, relationships between high risk areas, residential communities, and distance to fire stations was taken into consideration when creating this data. Risk was rated as low, medium and high. The majority of CEBE falls under the medium category. Areas of low risk are located in the center of the park and along the northern boundary. Areas of high risk are located along the southern border and in the northern end (Figure 27).

Recommendations

It is recommended that a plant survey be conducted in order to identify native and non-native species within CEBE. Herbaceous plant listings could only be found for the entire state of Virginia and it would be beneficial to have a listing for the region where CEBE is located. Once this is accomplished, Integrated Pest Management treatment areas may be identified if there are extensive areas of exotic or invasive species. Herbicides, either foliar or hack and squirt applications, should be applied to Ailanthus trees when cut to prevent suckering. A licensed applicator will be required as commercially distributed herbicides will not be successful in permanently killing the trees. In addition, witness

trees, or those trees present during the Civil War, should be mapped and identified. Witness trees may also serve as boundary markers. Eastern hemlock trees within CEBE should be monitored for woolly adelgid pests. Witness hemlock trees may be the only treated trees due to expense. Pine plantations have not yet been found within CEBE but this could be further researched. Information on forest age was not determined but may be important.

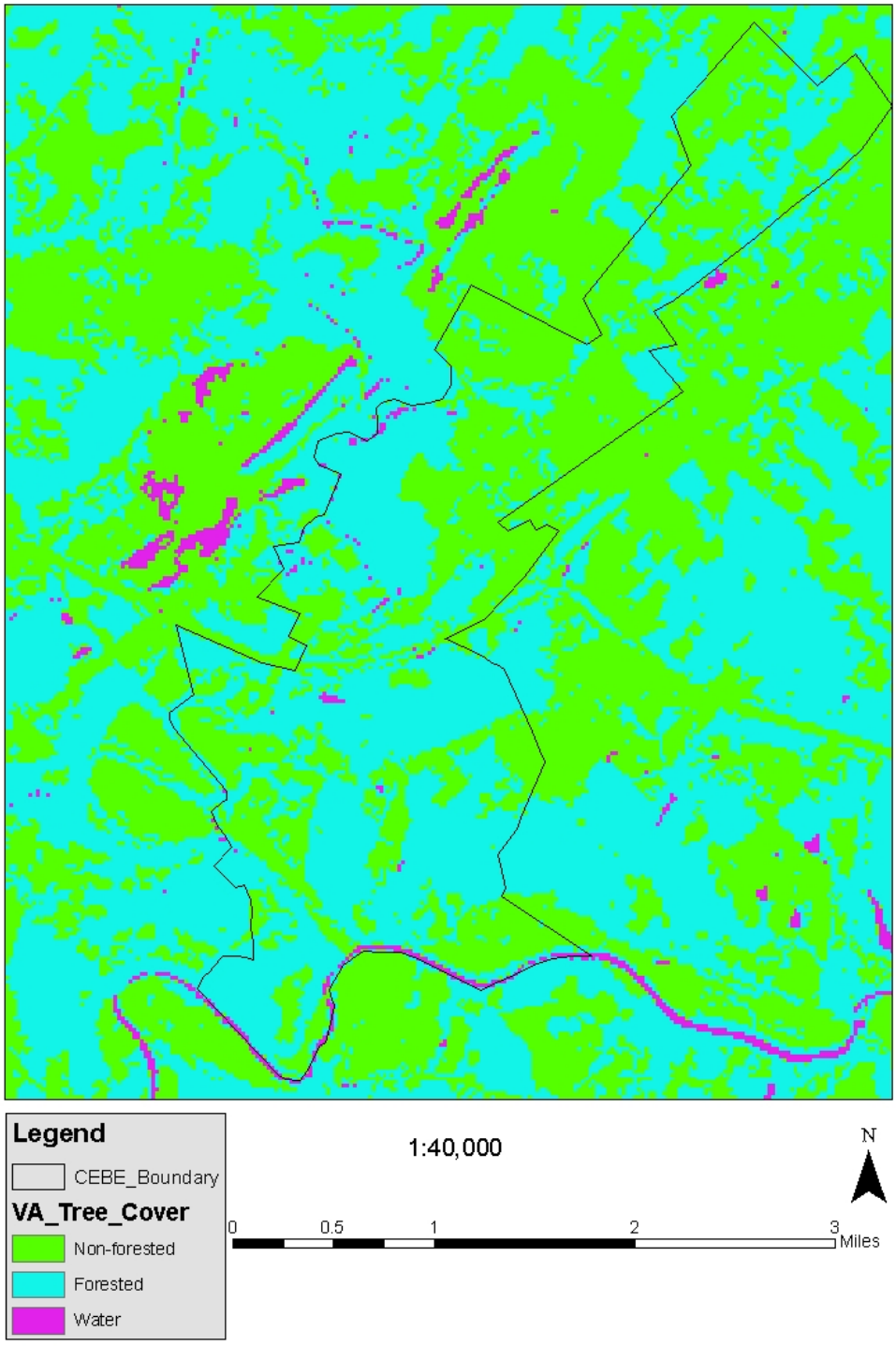

Figure 26. Forest cover within and surrounding the Cedar Creek and Belle Grove National Historical Park (CEBE). Map data provided by the Virginia Department of Forestry 2002.

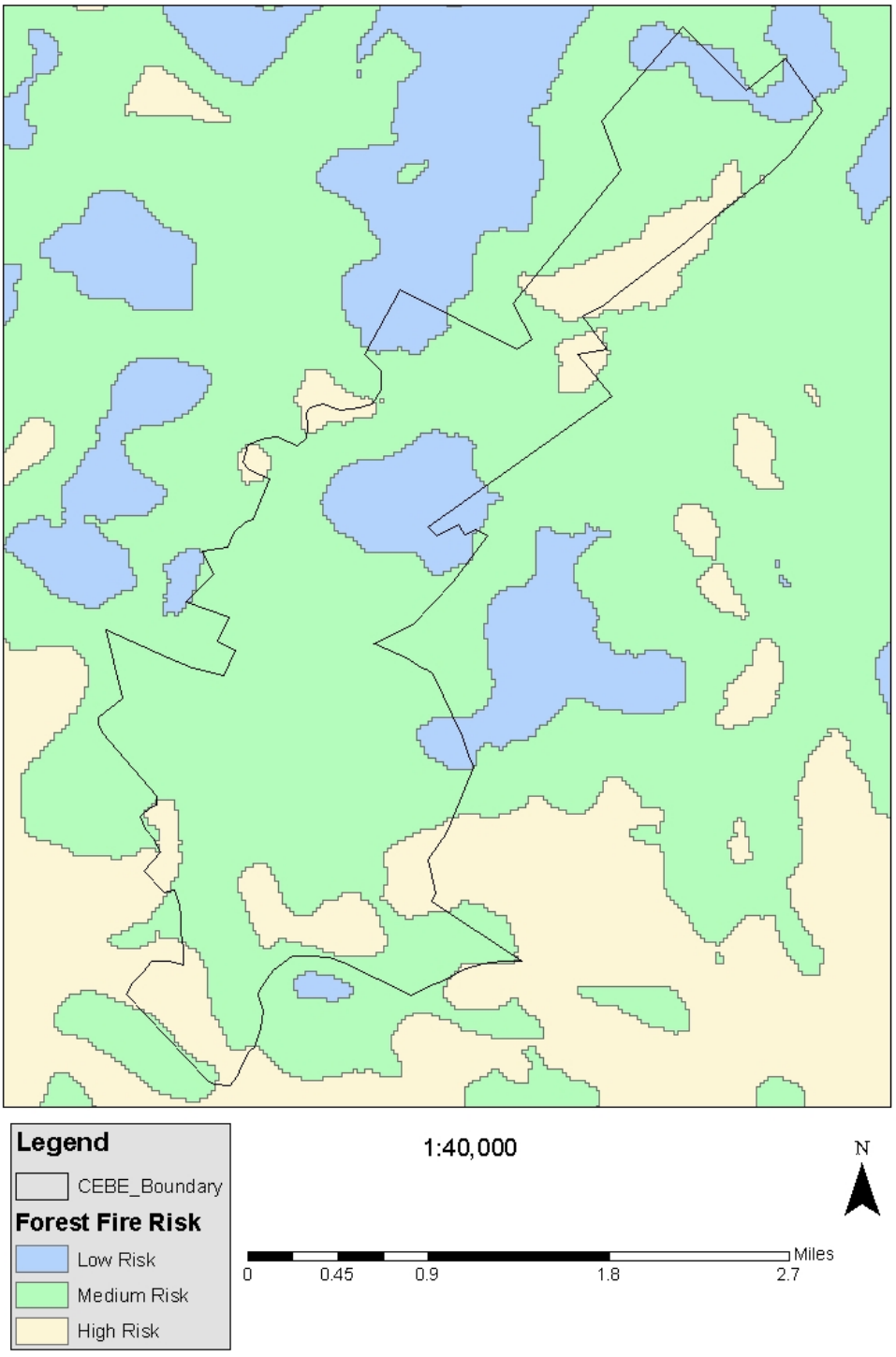

Figure 27. Forest fire risk within and surrounding the Cedar Creek and Belle Grove National Historical Park (CEBE). Map data provided by the Virginia Department of Forestry 2003.